

**REMARKS**

Claims 1-12 are pending in the application.

**Obviousness-Type Double Patenting Rejection**

Claims 1-12 stand rejected under the doctrine of obviousness-type double patenting over claims 1-13 of co-pending U.S. Patent Application No. 10/726,542. Applicants will reconsider the propriety of submitting a Terminal Disclaimer with respect to the '542 application to obviate this rejection once allowable subject matter has been indicated in this application.

**Rejection Under 35 U.S.C. § 103**

Claims 1-12 stand rejected under 35 U.S.C. § 103(a) over G. Antonelli, "Non-Destructive Condition Assessment of Serviced MCrAlY Coatings" ("Antonelli") or G. Antonelli et al., "Qualification of a Frequency Scanning Eddy Current Equipment for Nondestructive Characterization of new and Serviced High-Temperature Coatings" ("Antonelli et al.") in view of the "admitted prior art of the instant disclosure" ("APA") The rejection is respectfully traversed.

Claim 1 recites "a method of determining the service metal temperature of a  $\gamma/\gamma'$  MCrAlY-coated component after use of the component in a high temperature environment, where the  $\gamma/\gamma'$ -MCrAlY-coating of the component exhibits a non-equilibrium  $\gamma/\gamma'$ -microstructure at a temperature lower than the temperature during operation and the depletion of chromium from the  $\gamma/\gamma'$ -MCrAlY-coating still allows the  $\alpha$ -Cr phase to form, the method comprising: (a) measuring qualitatively impedance curves or measuring the coating electrical conductivity and magnetic permeability of

the non-equilibrium MCrAlY-coating of the component in the post-service condition at different locations of the component by means of a multi-frequency eddy current system; (b) then subjecting the coated component to a heat treatment to transform the non-equilibrium MCrAlY coating into an equilibrium microstructure of the coating; (c) then measuring qualitatively impedance curves or measuring the electrical conductivity and magnetic permeability of the equilibrium MCrAlY-coating at different locations of the component by means of a multi-frequency eddy current system; and (d) determining the exposure temperature of the different locations of the component based on the difference in the measured impedance curves or the measured conductivities and permeabilities, before and after the heat treatment according to (b)” (emphasis added). Applicants respectfully submit that the claimed method is not suggested by the applied combination of references for the following reasons.

As was discussed in the Amendment After Final Rejection filed on January 4, 2006, the inventors unexpectedly determined that the method recited in claim 1 provides for improved NDT coating assessment. Applicants determined that by subjecting a component including an applied  $\gamma/\gamma'$  MCrAlY-coating to the heat treatment recited at clause (b) in claim 1 (to produce an equilibrium microstructure of the coating) after using the component in a high temperature environment, i.e., in a post-service condition of the coating, and after performing step (a) and before performing step (c), a non-destructive testing method can be used to determine Al and/or Cr depletion within the  $\gamma/\gamma'$  MCrAlY-coating.

The final Office Action acknowledges that Antonelli and Antonelli et al. fail to suggest at least the features of “subjecting the coated component to a heat

treatment to transform the MCrAlY coating into an equilibrium microstructure of the coating," but asserts that the APA cures the deficiencies of Antonelli and Antonelli et al.

The Advisory Action states that:

Applicant's argument that it would not be obvious to apply the standar [sic] heat treatment recited in the admitted prior art of the instant disclosure as a heat treatment for articles already in use, such as the blades to be refurbished by the Antonelli references is not persuasive because the purpose of the heat treatment recited by the admitted prior art of the insta t [sic] disclosure (to transform non-equilibrium MCrAlY [sic]) is the same as the effect desired by both of the Antonelli references. Therefore since the same result is desired, motivation to employ a heat treatment known to produce this result, where the result is desired would have been a modification obvious to one of ordinary skill in the art at the time the invention was made.

Applicants respectfully disagree with these assertions.

The attached Declaration by Alexander Schnell Under 37 C.F.R. § 1.132 addresses the assertions set forth in the final Office Action and Advisory Action. As discussed at point (5) of the Declaration, in the gas turbine industry, the term "standard heat treatment" is commonly used by those skilled in the art with reference to heat treatments that are applied to specific superalloys. According to this usage in the gas turbine industry, the term "standard" means a heat treatment that is designed for a particular superalloy composition. Such heat treatments are typically recommended by the superalloy supplier.

At explained at point (6) of the Declaration, there is, however, no "standard heat treatment" for (sprayed) MCrAlY coatings applied on blades and vanes of parent superalloy materials used in the hot gas path of turbines. The term "standard heat treatment" is not pertinent to the MCrAlY coatings applied to the parent superalloy material of such components.

As also discussed in the Declaration, the "standard heat treatment" described at page 5, lines 19-21, and page 7, lines 7-8, respectively, of the present specification, is a standard heat treatment used for the parent superalloy materials. The "standard heat treatment" does not pertain to a heat treatment that is applied to the coatings.

Moreover, as discussed at point (10) of the Declaration, with regard to information backflow and performance of an ex-service component, subjecting an ex-service component to a heat treatment would cause the information that is stored in the component's microstructure to become distorted and thus detrimentally affect measurements taken after the heat treatments. Accordingly, one skilled in the art would not have expected that subjecting an ex-service component to a heat treatment as recited in claim 1, clause (b), would provide the advantages provided by the claimed heat treatment.

As discussed at point (11) of the Declaration, the present inventors determined that in order to be able to properly apply the FSECT technique to a  $\gamma/\gamma'$  MCrAlY-coated component that has been used in a high temperature environment (i.e., to be able to apply the FSECT technique to obtain a reliable assessment of the ex-service  $\gamma/\gamma'$  MCrAlY coating), the component needs to be heat treated according to the step recited in claim 1, clause (b). It was unexpectedly determined that subjecting an ex-service  $\gamma/\gamma'$  MCrAlY-coated component to the claimed heat treatment provides a solution to the above-discussed problems associated with the FSECT technique.

As explained at point (12) of the Declaration, the heat treatment recited in claim 1, clause (b), is different from a "standard heat treatment" performed on new

parts, which is designed for the particular parent superalloy material. The claimed heat treatment is performed on ex-service components for the purpose of determining information about the physical properties of the coating, and is performed to transform the non-equilibrium MCrAlY coating into an equilibrium microstructure of the coating. In stark contrast, a "standard heat treatment" is applied to a new part for the purpose of achieving a desired condition of the parent superalloy material. As such, one having ordinary skill in the art would not have applied a "standard heat treatment" designed particularly for the parent superalloy material for the same purpose that the heat treatment recited in claim 1, clause (b), is applied to a non-equilibrium MCrAlY coating, i.e., to transform the non-equilibrium MCrAlY coating into an equilibrium microstructure of the coating so that the FSECT technique can be applied to obtain a reliable assessment of the  $\gamma/\gamma'$  MCrAlY coating. Thus, the applied references do not support the alleged *prima facie* obviousness with respect to the method recited in claim 1.

Claims 2-12, which depend from claim 1, are also patentable over the applied references for at least the same reasons as those for which claim 1 is patentable. Therefore, withdrawal of the rejection is respectfully requested.


**Conclusion**

For the foregoing reasons, allowance of the application is respectfully requested. Should there be any questions concerning this response, or the application in general, Applicants' undersigned representative can be reached at the telephone number given below.

Respectfully submitted,

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Date: February 21, 2006

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